

UNIVERSIDAD NACIONAL DE TUCUMAN

INSTITUTO « MIGUEL LILLO »

LILLOA

REVISTA DE BOTANICA

DIRECTOR : HORACIO R. DESCOLE

TOMO XIV

Não Circula

TUCUMAN
REPUBLICA ARGENTINA

1948

NÃO PERMITIDO XEROX

FURTHER DATA ON THE GENUS NEUROPOGON

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RESUMEN

El autor amplía sus investigaciones taxonómicas sobre el género *Neuropogon* (Lichenes, *Usneaceae*), incorporando los resultados de sus observaciones sobre algunas especies en estado vivo como también del estudio de un nutrido material conservado en diferentes herbarios. Las siguientes nuevas entidades son descritas: *N. Rohmederi* M. Lamb, *N. Rohmederi* f. *ushuaiensis* M. Lamb, *N. melaxanthus* f. *fibrillifer* M. Lamb. y *N. trachycarpus* f. *elator* M. Lamb.

Some years ago the author published a preliminary taxonomic account of the genus *Neuropogon* (Lamb, 1939), based on the study of copious material preserved at the British Museum (Natural History). An attempt was made to evaluate the various morphological and chemical characters of importance for the segregation of natural units within the genus, and in the course of these studies it was found that many characters previously looked upon as good taxonomic criteria were actually of little or no systematic importance.

Since then the author, during two years spent in the Falkland Islands and adjacent regions of the Antarctic continent (Graham Land or Palmer Peninsula area), has had the opportunity of studying populations of a number of the species in the field, and this, together with the subsequent examination of further herbarium material, has thrown new light on many doubtful points in the classification. While no claim to finality can as yet be made, it is now possible to discern the funda-

mental taxonomic units of which this genus, seemingly so refractory to classification, is composed. Certain genera of fruticulose lichens, of which *Neuropogon* and *Usnea* are outstanding examples, cause initial bewilderment by the wealth of forms which they present and by the obvious intergrading of many characters which might have been expected to be serviceable in their classification. Up till now little has been done towards meeting these problems except the wholesale bestowal of specific names upon individual plants, with little or no attempt at statistical evaluation of the importance and constancy of the characters involved. For this reason the synonymy is, as might be expected, somewhat intricate. Obviously, monographic treatments of *Usnea* and *Neuropogon*, if they are to have any value at all, must rest on a very careful comparative study, also in the field, of entire populations, and not merely on the description of isolated herbarium specimens.

In the author's previous paper an attempt was made to use the character of presence or absence of specific lichen acids (depsidones) in the thallus as a systematic criterion. Within certain species both acid-bearing and acid-free states occur, and these states were given taxonomic rank as forms (*N. aurantiaco-ater* f. *normalis* and *egentissimus*, *N. trachycarpus* f. *trachycarpoides*, etc.). This was in accordance with established procedure in other genera, e. g., *Cladonia*, in which presence or absence of a certain chemical constituent, as revealed by positive or negative reactions, is regarded as taxonomically significant, even though unsupported by any morphological differences. But it has since become apparent that, in *Neuropogon* at least, the absence of acid in a normally « active » species, or conversely the presence of acid in a normally acid-free species, has at the most an ecological and distributional, and not a taxonomic, significance. For instance, these chemical « forms » are found occurring indiscriminately in certain species and in their varieties, and to follow out the system logically one would have to give separate names to the active and inactive states within each individual variety. Such a procedure would have little in common with rational classification. Accordingly, it now seems preferable to refer to these chemical states as

«phases» of the species; where the state has previously been given a systematic name, this can be retained to designate the phase, *e. g.*, the «sorediifer»-phase of *N. antarcticus*, the «egentissimus»-phase of *N. aurantiaco-ater*, etc. In the absence of a previous name, the phases can be referred to as «active» and «acid-free» respectively.

The presence of entirely distinct lichen acids, on the other hand, is a criterion of considerable taxonomic value, as it indicates completely different traits of metabolism. Such a character is surely fully specific, and its importance is also confirmed by distributional evidence, as in the case of *N. aurantiaco-ater* and *N. melaxanthus*. As will be shown in the following notes, active phases have now been detected in a number of species of *Neuropogon* hitherto known only in the acid-free phase, and by means of this it is now possible to group them in two natural chemical assemblages, *viz.*: 1) the *Salazic acid assemblage*, with the active phase containing Salazic acid, $C_{18}H_{12}O_{10}$, Salazic acid α -methyl ether, $C_{19}H_{14}O_{10}$, or Norstictic acid, $C_{19}H_{14}O_9$ (reactions: KHO + blood-red, Paraphenylenediamine + yellow to orange), and 2) the *Protocetraric acid assemblage*, in which the active phases contain Protocetraric acid, $C_{18}H_{14}O_9$, or Fumarprotocetraric acid, $C_{22}H_{16}O_{12}$ (reactions: KHO + faint brownish, Paraphenylenediamine + miniate or vermilion red).

Salazic acid assemblage

Protocetraric acid assemblage

*N. sulphureus**N. antarcticus**N. melaxanthus**N. aurantiaco-ater**N. acromelanus**N. insularis**N. ciliatus**N. trachycarpus*

Of uncertain position (known only in the acid-free phase)

*N. perpusillus**N. Taylora**N. Rohmederi*

(The horizontal connecting lines indicate close morphological affinity.)

Lynge has recently published a comprehensive account of *N. sulphureus* (Lynge, 1941), with full bibliography and distributional data, and a discussion of the phenomenon of bipolar

distribution which it illustrates. Apart from this, and the record of some species from Argentina, Nahuel Huapí, by Santesson (1942), no notable contributions to the study of the genus have been made since 1939. In this paper, of the thirteen species enumerated in the author's previous treatment (Lamb, 1939), one is relegated to synonymy and two are degraded to the rank of forms; one new species is described, so that the number of known species now stands at eleven (or twelve if we include the doubtful « *Usnea frigida* » of Dodge & Baker, of which the author has seen no material).

One point in the author's previous paper (Lamb, 1939) requires correction. On pp. 205-6 it was stated that endobasidial pycnidial fulcra are found in *Neuropogon*. Subsequent reexamination of the fulcra in several species of the genus has shown that they are in reality exobasidial, and appear to belong to the « Placodien-Typus » of Glück (1899). As the perifulcrum is usually highly convoluted, and the fulcra rather short, an appearance is produced very similar to that of an endobasidial apparatus.

The rest of this paper consists of additional notes on known species, the description of a new species and three new forms, an emended key to all known species, an alphabetical list of the synonyms and a list of some of the more important inaccurate determinations to be found in the previous literature, as revealed by an examination of the authors' actual material.

1. *N. sulphureus* (Koen.) Hellb. ¹

Exsiccata not previously mentioned: Santesson, Lich. Austroamer. ex Herb. Regnéll., fasc. XV, n° 360; Savicz, Lichenotheca Rossica, Decas V, n° 43.

Its distribution in the Arctic has been enumerated and mapped by Lynge (1941). It is known from arctic Canada, W. and E. Greenland, Jan Mayen, Iceland, Spitsbergen, Franz Josef Land, Novaya Zemlya, and the New Siberian Islands, but has not been found on the mainlands of Europe, Asia or North

¹ For citations and synonymy, see Lamb, 1939.

America. In the southern hemisphere it had been found at high altitudes in Ecuador, Peru and Bolivia, and also in the Antarctic (Lamb, 1939). Certain of the gaps between Bolivia and the Antarctic can now be filled in, thanks mainly to the observations of Santesson, who, on the Swedish Magellanic Expedition of 1939-40, found it in the following localities (material seen by the author at Uppsala):

CHILE. *Territorio Aisen*: Coihaique, altit. 1200 m. (This locality is in the southern Andean chain, almost on the boundary line between Chile and Argentina).

ARGENTINA. *Tierra del Fuego*: Sierra Alvear, above Las Cotorras (about 20 km E.N.E. of Ushuaia), altit. 900-1000 m.

A few small specimens were also gathered by Rohmeder in 1945, together with the type material of *N. Rohmederi*, in W. Patagonia:

ARGENTINA. *Chubut*: Lago Futalaufquen, altit. 1800-2000 m. (Herb. Crypt. Instit. Miguel Lillo). This is also in the Andean chain near the Argentine-Chilean boundary.

N. sulphureus is present in the author's collections from a number of localities in the Graham Land or Palmer Peninsula sector of the antarctic continent. A detailed enumeration of the localities, with distributional map, will be given in a general work on antarctic lichens now in preparation. Provisionally it can be stated that the species is common on the mainland and islands of the east coast of the peninsula, from the northern end of the Crown Prince Gustav Channel southwards; on the west coast of the peninsula, however, it has been found only in one locality (in the Palmer Archipelago), being replaced there almost entirely by its subvicarious «twin», *N. antarcticus*. The distributional areas of these two species are thus fairly sharply separated; only in a limited area in the N.E. of the region, on the Trinity Peninsula and Duse Bay, do they occur intermingled in approximately equal proportions, *N. antarcticus* apparently there reaching its easterly limit. No explanation has yet been found for this rather remarkable distributional difference. The material gathered by the Swedish South Polar Expedition of 1901-03 on Snow Hill Island, east of the Graham Land peninsula, is the typical antarctic state

of *N. sulphureus* (material seen by the author at Stockholm). The species has also been found on the other side of the antarctic continent, in South Victoria Land (Lamb, 1939, p. 209).

The leading characteristic of *N. sulphureus* has been said to be the lax nature of the medulla (Motyka, 1936, Lamb, 1939), and in specimens from the southern hemisphere this feature is very conspicuous, the central axis taking up only one-fifth to one-quarter of the diameter of the branch, the medullary hyphae being loosely interwoven and almost arachnoid. In arctic specimens, however, the medulla is usually more or less compact, with the central axis occupying approximately one-third of the diameter of the branch. There are exceptions to this rule, and some arctic specimens have a quite loose medulla and thin central strand like the southern hemisphere plants; but the beginnings of a regional differentiation can be discerned, and it is possible in 90 per cent. or more of the cases to tell, without looking at the label, whether a given specimen is from the arctic regions or from the southern hemisphere. The remaining 10 per cent. or so are intermediate as regards this character. *N. sulphureus* never appears to have such a thick central strand as *N. antarcticus*, in which the latter takes up from one-third to one-half of the diameter of the branch. Apart from that there is an almost constant difference in the soredia: in *N. sulphureus* (both arctic and antarctic specimens) they are pulvinate, blackish (or whitish by erosion), and of compact appearance; as seen under a $\times 10$ lens with a scabrid, but not farinose or mealy-granulose surface (« they did not look too vital, specially when darkened. One should quite believe them to be corticated »: Lynge, 1941, p. 7). *N. antarcticus*, on the other hand, has the soredia eroded, \pm plane or pulvinulate, light in color (yellowish), and distinctly farinose or powdery-granulose as seen under a $\times 10$ lens. But specimens of *N. sulphureus* from the Andes of South America, unobjectionably identified by the lax, arachnoid medulla, have soredia more of the *N. antarcticus*-type.

Study of much material of *N. sulphureus* in the Antarctic led to the discovery that it may occur in an active phase, the medulla of some plants containing Salazic acid, Salazic acid

α -methyl ether, or Norstictic acid, and giving the reactions: $\text{KHO} + \text{red}$, $\text{Pd} + \text{yellow}$. This is additional proof of the distinction between this species and *N. antarcticus*, the active phase of which contains Fumarprotocetraric acid. In some localities in E. Graham Land the typical acid-free and the active phases were found growing intermingled; the former appeared to be rather more common over the area as a whole. The active phase is not confined to the Antarctic, for the specimen from Tierra del Fuego, Sierra Alvear, mentioned above, also gives positive reactions. No northern hemisphere material has yet been found in the active phase.

Much time was spent searching for fruiting specimens of this species in the field, but without success, and the apothecia continue to be unknown.

In the herbarium of the Botanical Museum of Uppsala there is a fine set of specimens of *N. sulphureus* from Spitsbergen, Augusti Bay (Wahlenberg Bay) coll. A. Malmgren, 1861, and in one of them the soredia have proliferated into minute spiny processes as described by the author (Lamb, 1939, p. 210) for «*f. acanthella*». It is doubtful whether this state really merits a systematic name; it has also been seen in *N. antarcticus* and *N. acromelanus*, and seems to be due to the «germination» of the soredia *in situ*. Grummann, in a recent work (1941), designates this abnormality as «*Typus adnatus*».

As regards its ecology: Lynge (1941) observes that in the Arctic it is a calciphobe species restricted to the more durable types of rock, is not nitrophilous, and ascends to altitudes of at least 1700 m. The present writer's observations in the Antarctic confirm these statements. It is common at and above sea level, and goes up to 650 m (the highest point visited) in the Trinity Peninsula. The finest specimens were gathered a short distance inland, on gently sloping stony slopes periodically irrigated by trickles of snowmelt water.

Finally, mention should be made of two erroneous records. «*Usnea sulphurea*» recorded from New Zealand by Szatala (1939) refers, according to Köfarágo-Gyelnik *in litt.*, to *Usnea xanthopoga* and «*Usnea sulphurea*» recorded from Argentina, between Rio Gallegos and Punta Arenas, by Herre (1944) is

N. trachycarpus (duplicate specimen seen in Herb. Crypt. Instit. Lillo).

2. *N. antarcticus* (DR.) M. Lamb.

A more complete account of the distribution of this species can now be given. It appears to have its center of distribution in the antarctic continent, with bicentric subantarctic outliers in the S. American and Kerguelen sectors, as follows:

S. American sector.

CHILE. *Magallanes*: Mt. Aymond (Lamb, 1939, p. 214); Lago Maravillo, coll. Santesson, 1940; Isla Navarino, altit. 10 m, coll. Santesson, 1940 (seen at Uppsala).

ARGENTINA. *Tierra del Fuego*: Staten Island, Isla Observatorio, coll. Swed. South Polar Exped., 1901-03 (Herb. Mus. Bot. Stockholm, named «*Neuropogon melaxanthum*» by Darbishire); near Ushuaia, altit. 700-1000 m, coll. Santesson, 1940 (Uppsala Museum); San Sebastián, coll. Dusén, 1896 (Uppsala Museum); Santa Cruz: N. coast of Lago Viedma, alt. 1200 m, coll. Hogberg, 1903 (Herb. Inst. Darwinion).

SOUTH GEORGIA. Cumberland Bay and Royal Bay, coll. Swed. South Polar Exped., 1901-03 (Herb. Mus. Bot. Stockholm, named «*Neuropogon melaxanthum*» by Darbishire); Grytviken, coll. Carcelles, 1929 (Herb. Mus. Argent. Cienc. Nat.); also a specimen in the British Museum Herbarium, without exact locality, collected by the Shackleton-Rowett expedition of 1921-22.

Kerguelen sector.

KERGUELEN (Lamb, 1939, p. 214).

HEARD ISLAND (Zahlbruckner, 1906, p. 52).

In the antarctic continent itself it is known to occur in both the Graham Land and the Ross Sea areas, and intermediately, but has not yet been found in the Coats, Queen Maud, Enderby, or Queen Mary sectors. However, its occurrence in the subantarctic Kerguelen sector makes it seem probable that it occurs there also, and is therefore circumpolar. In the Graham Land region it is extremely common all down the west coast, and also in the South Shetlands and Orkneys, but penetrates only

a short way down the east coast of the Graham Land peninsula, where it has been found at Duse Bay, the north end of Crown Prince Gustav Channel, and the islands of the Erebus and Terror Gulf. Further south along this coast it appears to be entirely replaced by *N. sulphureus*, as explained above.

The active or «sorediifer»-phase, containing Fumarprotocetraric acid, occurs not only in the subantarctic stations but also in the Graham Land peninsula, where according to the author's observations it is almost equally as common as the acid-free phase.

Regarding the morphology of the species, there is little to be added to the observations previously made (Lamb, 1939). Apothecia are obviously very rare; one of Santesson's specimens, in the «sorediifer»-phase, from Tierra del Fuego, near Ushuaia, bears apothecia with soredia also on the receptacles, forming an interrupted or almost continuous zone at the periphery, and a few are also present in the specimen from South Georgia, Grytviken. The largest specimen ever seen by the writer was in the Trinity Peninsula, Graham Land; it attained a height of 10 cm. A specimen collected by Santesson in Tierra del Fuego, near Ushuaia, has some of the soredia proliferating into minute spiny fibrillae, similar to those described in *N. sulphureus* as «f. *acanthella*» (Lamb, 1939, p. 210).

3. *N. Taylori* (Hook. fil.) Nyl.

4. *N. insularis* M. Lamb

No further information on these two species has become available since 1939. Räsänen's record of «*Usnea Taylori*» from western Fuegia (Räsänen, 1932) needs confirmation; the author has not seen the material in question.

5. *N. ciliatus* (Nyl.) Kphbr.

This species was previously known from New Zealand and Fuegia. Many fine specimens from New Zealand, South Island, are in the herbarium of Prof. Du Rietz at Uppsala, collected by him on the Swedish Botanical Australasia Expedition of 1926-27. Santesson collected it in Chile in 1940: Magallanes,

Isla Navarino, altit. 10 m (seen at Uppsala). In the herbarium of the Stockholm Museum there is also a specimen from Chile, Magallanes, Puerto Yartou, Nose Peak, coll. Roivainen, 1929, determined by Räsänen as « *Usnea trachycarpa* var. *eciliata* ». Argentine specimens seen were from Río Negro, Cerro Tronador, coll. Aranda, 1943, and Menéndez, 1943 (Herb. Crypt. Instit. Lillo), Lago Frías, Cerro Rigi, coll. Pérez-Moreau, 1940 (Herb. Mus. Argent. Cienc. Nat.); Gob. Neuquén, Cumbre Co. Betveder, altit. 1928 m, coll. De Barba, 1947 (Herb. Crypt. Instit. Lillo) and Paso de Pino Hachado, coll. Pérez-Moreau, 1941 (Herb. Mus. Argent. Cienc. Nat.); National Park of Nahuel Huapi, coll. Pérez-Moreau, 1940, 1943, 1945 (Uppsala Museum and Herb. Mus. Argent. Cienc. Nat.). The writer also collected it in the Falkland Islands in 1944, near Port Stanley, on quartzite rocks at an altitude of 300 m, growing together with *N. melaxanthus*. The species may therefore be said to belong to the subantarctic bicentric element, with centers of distribution in the S. American and the New Zealand-Australian sectors.

The character of black-edged transverse annulate cracks in the cortex of the stems and branches, emphasised in the author's previous paper (Lamb, 1939), is not entirely constant, often lacking in S. American specimens, but plants in which they are absent can be recognised by the smooth waxy surface of the stems and branches, smooth underside of the apothecial receptacles, and thin thalline margin, often almost excluded in older apothecia. One magnificent specimen in the Uppsala Museum, collected by Berggren in New Zealand in 1874-75, is 10 cm high, and has the black-edged cracks on the stems and branches so well developed that they form a tessellate-reticulate pattern. The medulla is always compact, but the axis is usually not so stout as for instance in *N. antarcticus* and *N. aurantiacater*; it occupies approximately one-third of the thickness of the branch. Nearly all specimens seen represent the active phase, containing Salazic acid, Salazic acid α -methyl ether, or Norstictic acid, the exceptions being the plants from Argentina, Cerro Tronador, Nahuel Huapi and Neuquén, mentioned above, and the antarctic plant described as var. *subpolaris* (Lamb, 1939, p. 217). It now seems somewhat doubtful whether

the latter really belongs to *N. ciliatus*. The specimen from Río Negro, Cerro Rigi, coll. Pérez-Moreau, and also one by the same collector from Nahuel Huapí, 1945, is peculiar in having most of the apothecial discs brown, with transitions into the normal black color.

Motyka (1936, p. 544) considers that *Usnea lutescens* Stirt., in *Trans. & Proc. N. Zeal. Instit.*, XXX (1898) 388, may be a synonym of this species, to judge from Stirton's description. Neither Motyka nor the present author have seen the type specimen.

6. *N. acromelanus* (Stirt.) M. Lamb

This occurs in New Zealand, Tasmania, and S. Patagonia; possibly also in South Africa (see below). In Tasmania and Patagonia the acid-free «inactivus»-phase is also known to occur. The variety *decipiens*, which may well be entitled to the rank of a proper species, has been found in Tasmania, Chatham Island, Peru, southern Chile and Argentina, and the Graham Land (Palmer Peninsula) promontory of Antarctica. Du Rietz collected much material of *N. acromelanus* in its typical state from the South Island of New Zealand (Swedish Botanical Australasia Expedition, 1926-27, seen at Uppsala). Material is present in Herb. Crypt. Instit. Lillo from Argentina: Chubut, Cerro Negro, coll. P. Stipanovic, 1943, and Pascual Crespo, 1943, and in the Darwinion Institute from Argentina, Santa Cruz, Puerto Ferrari and Bilbao, coll. C. M. Hicken, 1914; all in the «inactivus»-phase. A specimen recently communicated from South Africa by Dr. S. Garside also probably belongs to this species; it is from the Clanwilliam Division, between Tafelberg and Spout, Cedarberg, altit. 2000 m, «in small communities, saxicolous on shaded, sheltered sandstone faces», coll. E. Schelpe, 1947 (n° 1961 *pr. p.*). The determination is not entirely certain, and the plant is paler in color than is usual in *Neuropogon*; if correct, this is the first record of the genus from the African continent. The medulla is Pd—.

N. acromelanus usually grows to a fairly large size, about 6 cm, but occasionally more stunted specimens, only 2.5-3.5 cm tall, are met with. In the specimen from Chubut, coll. Stipa-

nicic, many of the soredia have proliferated into very small cornute outgrowths, similar to those described as «f. *acanthella*» in *N. sulphureus* (Lamb, 1939, p. 210).

The antarctic formae *picatus* and *scabridulus* (Lamb, 1939, p. 220) seem to be of uncertain systematic position, and may perhaps be actually states of *N. sulphureus* or *N. antarcticus*. The material is not now available for revision, but it is hoped to settle the question definitely at a later date.

Var. *decipiens* M. Lamb

This variety has now been found in ten widely separated localities, and the material is so homogeneous in its morphological characters that it might possibly be considered a distinct species. The new distributional records for it are as follows:

CHILE: *Magallanes*: Canal Beagle, Yendegaia, altit. 50-100 m; Seno Skyring, near the shore; Isla Navarino, altit. 10 m; *Territorio Aisen*: valley of river Aisen, altit. circ. 1400 m, coll. Dusén, 1897 (seen at Uppsala, the specimens from Magallanes collected by Santesson, 1940).

ARGENTINA. *Tierra del Fuego*: near Ushuaia, altit. 700-800 m, coll. Santesson, 1940 (seen at Uppsala).

ANTARCTICA: *Graham Land (Palmer Peninsula)*: Palmer Archipelago, Wiencke Island, altit. 250 m., coll. M. Lamb, 1944 (Herb. Mus. Brit.).

The antarctic specimen was growing on rocks of a mountain buttress projecting through the snow, and was intermixed with *N. antarcticus* and *N. aurantiaco-ater*. It was fertile, the first find of apothecia in this species. The apothecia are situated near the ends of the branches, are 2-3 mm. in diam., with yellow, smooth or slightly uneven receptacles, devoid of cilia, and black, matt or subnitid, naked discs. One of the apothecia had leprose sorediate patches on the edge of the receptacle. Hypothecium colorless (or faintly sordid yellowish in thick section); thecium 50-60 μ high, aeruginose-blackish in upper third. No ripe asci or spores found.

Material of var. *decipiens* is usually in the active phase (medulla KHO + red, Pd + yellow or orange), but the specimen from Chile, Aisen, is in the acid-free condition.

7. *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb

Exsiccata: Santesson, Lich. Austroamer. ex Herb. Regnell., fasc. XVII, n° 422.

N. aurantiaco-ater was well represented in Santesson's collections from Fuegia made in 1940, and examined by the writer at Uppsala. The localities were:

CHILE. *Magallanes*: Puerto Yartou, altit. 700 m; Isla Navarino, altit. 10 m; Porvenir, altit. 300 m; Punta Arenas, altit. circ. 500 m.

ARGENTINA. *Tierra del Fuego*: above Las Cotorras, about 20 km ENE. of Ushuaia, altit. 650-1000 m; Monte Marcial above Ushuaia, altit. 700 m.

Other specimens seen were from:

CHILE. *Magallanes*: Río Azopardo, coll. Dusén, 1896; Isla Hoste, Orange Bay, coll. ?, 1883 (both in Uppsala Museum); Mt. Buckland, coll. Roivainen, 1929 (Herb. Mus. Bot. Stockholm, determined by Räsänen as «*Usnea Taylora* var. *subspadicea*») extinct volcano near Río Pérez, coll. A. Benove 1913 (Herb. Inst. Darwinion).

ARGENTINA. *Tierra del Fuego*: near Lago Fagnano, altit. circ. 1000 m, coll. Skottsberg, 1908 (Uppsala Museum); Bahía Thetis, coll. Umana, 1941 (Herb. Crypt. Instit. Lillo); «Cerro de 500 m al S. de Estancia 'La Marina'», coll. Argentine Faculty of Sciences Exped., 1921 (Herb. Mus. Argent. Cienc. Nat.); *Río Negro*: Cerro Tronador, coll. Aranda, 1943, and Menéndez, 1943 (partly f. *strigulosus*) (Herb. Crypt. Instit. Lillo); Lago Frías, Cerro Rigi, coll. Pérez-Moreau, 1940 (Herb. Mus. Argent. Cienc. Nat.).

FALKLAND ISLANDS (ISLAS MALVINAS). Berkeley Sound, coll. M'Cormick, 1843 (Herb. Mus. Brit.).

SOUTH GEORGIA. Royal Bay, coll. Swed. South Polar Exped., 1901-03 (Herb. Mus. Bot. Stockholm, determined by Darbishire as «*Neuropogon melaxanthum*»); Grytviken, coll. Larsen, 1909 (Uppsala Museum) and Carcelles, 1929 (Herb. Mus. Argent. Cienc. Nat.). Previously recorded from South Georgia by Du Rietz (1926).

SOUTH ORKNEYS. Exact locality not stated, coll. Moneta, 1927 (Herb. Mus. Argent. Cienc. Nat.).

The species has also been recorded from Nahuel Huapí, Río Negro, Argentina, by Santesson (1942), and other specimens from that locality, collected by Pérez-Moreau, are present in the herbarium of the Museo Argentino de Ciencias Naturales.

The most northerly record known to date is that from Chile: Bio-Bio, Antuco (erroneously given as « Antuca » in Lamb, 1939, p. 225).

The Chilean and Argentine specimens often have the basal branches very smooth, often \pm shining and somewhat wax-like in appearance, and occasionally may show incomplete black-edged transverse cracks, giving an appearance similar to that of the stems of *N. ciliatus* or *N. acromelanus*. The upper branches, however, become progressively more verruculose (or plicate-costate in aged individuals) from below upwards, and in particular the underside of the apothecial receptacles is always distinctly verruculose-rugulose. A few otherwise quite typical individuals in a collection made by Pérez-Moreau in the National Park of Nahuel Huapí, Cerro Dormilón, 1943, have sparsely scattered, large, pulvinate, pale-colored, sorediate efflorescences on some of the ultimate branches; probably an abnormal condition, and not referable to *N. antarcticus*.

From the examination of further material it has become apparent that *N. strigosus* (Zahlbr.) M. Lamb (1939, p. 229), with its f. *subciliatus* (Zahlbr.) M. Lamb (*op. cit.*, p. 231), is only a form of *N. aurantiaco-ater*, differing in the presence of fibrillae on the apothecial margins, and may be called *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb, **comb. nov.** The number of the fibrillae is variable, some apothecia having only two or three. In all other respects plants belonging to this form show good agreement with the typical species. The form *subciliatus* is hardly worthy of taxonomic distinction. The f. *strigosus* has been seen from the following localities:

CHILE. *Magallanes*: Río Azopardo, coll. Dusén, 1896 (Herb. Bot. Gard. Gothenburg, determined by Zahlbruckner as « *Neuropogon melaxanthus* var. *normalis* »; *Territorio Aisen*: Coihaique, coll. Santesson, 1940 (seen at Uppsala).

ARGENTINA. Patagonia, without exact locality, coll. Neumann (Lamb, 1939, p. 230, 231); *Tierra del Fuego*: near

Ushuaia, coll. Santesson, 1940 (seen at Uppsala); *Río Negro* : Cerro Tronador (see above); Nahuel Huapí, Brazo Rincón, Cerro Dormilón, coll. Pérez-Moreau, 1940, 1943 (Herb. Mus. Argent. Cienc. Nat.).

SOUTH GEORGIA. Exact locality not stated, coll. Bergström (Herb. Bot. Gard. Gothenburg, determined by Vainio as « *Usnea melaxantha* », and mixed with the typical form).

No material of this form has yet been seen from the Graham Land peninsula or adjacent islands, where all the plants seem to have constantly eciliate apothecia. As in the typical species, the various gradations of Fumarprotocetraric acid content (typical, « *normalis* », and « *egentissimus* » phases) are also found in *f. strigosus*.

The specimens from Chile, Coihaique, and South Georgia, Grytviken (coll. Carcelles) referred to above, are peculiar in having some of the younger apothecia with brown discs (as in *N. trachycarpus*), and showing transitions to the normal black color via various shades of aeruginose. The same phenomenon has been observed in some plants of *N. melaxanthus* and *N. ciliatus*.

The *f. nigropallidus* (Ceng. Samb.) M. Lamb, 1939, p. 224, is only a growth-state of the species, and can be regarded as a synonym of the typical form.

« *Usnea Taylora* var. *subspadicea* » Räsänen, according to a specimen from Chile, Magallanes, Mt. Buckland, in the Stockholm Museum, is *N. aurantiaco-ater*. A syntype specimen of « *Usnea Taylora* var. *Kranckii* » Räsänen, from Chile, Magallanes, Puerto Yartou, also in the Stockholm Museum, is a sterile, copiously fibrillose plant in the acid-free phase looking very like the « *nigropallidus* » growth form of *N. aurantiaco-ater*, but the possibility of its being the acid-free « *Hyppae* »-phase of *N. trachycarpus* could not be excluded. Inspection of the fertile holotype in herb. Räsänen would be necessary to decide the question.

8. *N. melaxanthus* (Ach.) Nyl.

Exsiccata : Lechler, *Pl. Ins. Maclovian.*, ed. R. F. Hohenacker, nos 69, 69 a; Zahlbruckner, *Lich. Rar. Exsicc.* n° 20.

Usnea aurantiaca Motyka, 1936, p. 29.

Neuropogon aurantiacus M. Lamb, 1939, p. 229.

The author collected this species in great abundance in the E. Falkland Islands in 1944 and 1946. It is the dominant lichen species on many outcrops of quartzite rock around Port Stanley, from sea level upwards, and in places forms quite extensive swards over the rock faces.

All specimens seen contain much depsidone lichen acid, the medulla giving an instantaneous blood-red reaction with KHO. Occasionally one finds a specimen with pale (buff colored) apothecial discs, showing transitions into greenish black. The phenomenon is not due to shading, apparently. One specimen (Lamb n° 2873) had the apothecia furnished with a few very small fibrillae at the margins, an uncommon state analogous to the f. *strigulosus* of *N. aurantiaco-ater*, and which may be called *N. melaxanthus* f. *fibrillifer* M. Lamb, n. f. ¹.

The exsiccata Zahlbruckner, *Lich. Rar. Exicc.* n° 20, which is the type material of Motyka's « *Usnea aurantiaca* », proved on examination (example in herb. Vrang, Falköping) to be only a rather juvenile state of *N. melaxanthus* with copious fibrillae on the branches. It was collected in the Falklands by D. Coleman.

Motyka's record of this species from South Georgia is erroneous; the plant in question, collected by Bergström, 1921, being *N. aurantiaco-ater* (seen in Herb. Bot. Gard. Gothenburg). It is very doubtful whether *N. melaxanthus* occurs in the South Shetlands or in New Zealand, as stated by Motyka.

9. *N. trachycarpus* Stirt.

Exsiccata: Santesson, *Lich. Austroamer. ex Herb. Regnell.*, fasc. XVII, n° 423.

The content of Salazic acid in this species is variable; in the typical phase it is rather low, in the « trachycarpoides »-phase it is high, and in some cases it is absent altogether. « *Usnea Hyypae* » Räsänen was founded on such an acid-free individual of *N.*

¹ *Apotheciis ad marginem ciliis nonnullis paucis munitis.* Type material in Herb. Mus. Brit.

trachycarpus, and so for such plants the term « Hyypae »-phase can be used.

Material has been recently seen from the following localities :

CHILE. *Magallanes* : Cerro Chico (on east shore of Admiralty Sound), coll. Roivainen, 1928 (Herb. Mus. Bot. Stockholm, called « *Usnea Taylora* var. *subciliata* » by Räsänen); Isla Navarino, coll. Santesson, 1940 (seen at Uppsala); *Territorio Aisen* : Río Aisen, coll. Dusén, 1897 (Herb. Mus. Bot. Stockholm); Chihaique Alto, altit. 1000 m, coll. Santesson, 1940 (*Lich. Austro-amer. ex Herb. Regnell.*, n° 423).

ARGENTINA. *Tierra del Fuego* : Canal Beagle, coll. Gusinde, 1919 (Uppsala Museum); Cerro Millaldeo (on the north side of Lago Fagnano) (Herb. Mus. Bot. Stockholm, syntype material of « *Usnea Hyypae* » Räs.); near Ushuaia, altit. 650-1000 m, coll. Santesson, 1940 (seen at Uppsala); *Santa Cruz* : Dept. Guar Aiken, road to Punto Arenas, 60 km S. W. of Río Gallegos, altit. 30 m, coll. Eyerdam, Beetle and Grondona, 1939 (Univ. California 2nd. Bot. Gard. Exped. to the Andes, 1938-39) (duplicate specimen in Herb. Crypt. Instit. Lillo); Río Gallegos, coll. Santesson, 1940; Río Fósiles, altit. circ. 1000 m, coll. Dusén, 1905 (seen at Uppsala); Puerto Ferrari, coll. Hicken and Reichert, 1914 (Herb. Inst. Darwinion); north shore of Lago Viedma, altit. 1200 m, coll. Hogberg, 1903 (Herb. Inst. Darwinion); *Río Negro* : Las Americanas (see below, under f. *substrigulosus*); *Chubut* : Pampa Chica, coll. Skottsberg, 1908; Cerro Lelej, coll. Skottsberg, 1908 (Herb. Mus. Bot. Stockholm).

FALKLAND ISLANDS (ISLAS MALVINAS). Port Stanley, coll. Swed. South Polar Exped., 1901-03 (Herb. Mus. Bot. Stockholm), and also by the author in 1946.

N. trachycarpus has also been recorded from Nahuel Huapi in Río Negro, Argentina, by Santesson (1942). This appears to be the most northerly locality known for the species.

In the Falkland Islands the author found *N. trachycarpus* to be much less common than *N. melaxanthus*. It is the only species in which the texture of the medulla varies from lax to compact. It is fairly constant in appearance, with its characteristically highly fibrillose stems and branches, and copiously ciliate apothecia with the disc always pale buff brown, never becom-

ing black. Very aged specimens may assume an abnormal appearance, shedding the fibrillae off the branches, which ultimately become scrobiculate-foveolate or finely verruculose, and occasionally, as in the specimen from Santa Cruz, Puerto Ferrari, mentioned above, the apothecia may be relatively very large compared to the height of the thallus, up to 2 cm in diameter, variously lobed and contorted and with the cilia worn off, the plant then looking not unlike some small agaricine Basidiomycete, *e. g.* *Cantharellus*. Sometimes in the «trachycarpoides»-phase the concentration of Salazic acid in the medulla may be so high as to give the reactions: KHO + very deep blood-red, almost black, Pd + orange-red¹.

Räsänen's «*Usnea Taylora* var. *subciliata*» is a synonym of this species, as seen from a specimen thus named in the Stockholm Museum.

F. substrigulosus (M. Lamb) M. Lamb, *comb. nov.*

Neuropogon substrigulosus M. Lamb, 1939, p. 231.

This has been found to be inseparable specifically from *N. trachycarpus*. It differs from the typical form in its generally coarser and more robust growth habit and in the thicker margi-

¹ *N. trachycarpus*, by its light colored apothecial discs, seems to afford a connecting link between *Neuropogon* and *Usnea*. Motyka (1936, p. 73) has described a species of *Usnea*, *U. neuropogonoides* Mot., of which he states: «Colore luteo et summitatibus nigratis ac superficie irregulariter foveolata et tuberculata accedit ad subgenus *Neuropogon*, praecipue ad *U. trachycarpa*». Through the courtesy of Dr. Rolf Santesson I was able to examine the type specimen of this *Neuropogon*-resembling *Usnea*. It is known only from the type collection from Argentina, Santa Cruz, Río Fósiles, on rocks, coll. P. Dusén, 1905. Unfortunately it is sterile. It is of a strong yellow color, as in *Neuropogon*, and the extreme apices, which are subcapillary and often conspicuously furcate, are more or less strongly darkened (aeruginose-blackish); parts of the thicker branches may also be unevenly aeruginose. Central strand comparatively thin (about 1/3 of diameter of branch in upper branches, about 1/4 in lower thicker stems), but the medulla is compact, not laxly arachnoid, and white, Pd—. The rather lax and entangled habitus is unlike that of a *Neuropogon*, and so, pending the finding of fertile specimens, it seems best to leave this species in the genus *Usnea*.

nal cilia on the apothecia (0.3-0.5 mm thick, as against 0.3 mm or less in the type). A specimen in the acid-free phase, apparently belonging here, was gathered in Argentina: Río Negro, Las Americanas, by Dusén, 1897, and is preserved in the Stockholm Museum.

Santesson collected in 1940 in Tierra del Fuego some material which belongs to another distinct form,

F. elatior M Lamb, *n. f.* (Tab. nostra II, fig. 3).

Differt proceritate majore: (3.5-) 5 — 9 centim., et modo crescendo laxiore.

ARGENTINA. *Tierra del Fuego*: Sierra Alvear, southern slope, above Las Cotorras (about 20 km. ENE of Ushuaia), on rocks in the alpine region, altit 900-1000 m (n° 640 b, holotype); the same locality, but lower down, 800-900 m; also in a different locality on the other side of the Las Cotorras valley, known as Sierra Sorondo, altit. 800 m; S.E. slope of Monte Marcial above Ushuaia, altit. 700 m. Type material in Herb. Mus. Bot. Stockholm and in herb. M. Lamb.

The plants are mostly fibrillose on the stems and branches, but not so densely as in the typical form. The apothecial receptacle, however, is very densely ciliate at its margin, and to a lesser extent also on the underside, with variegated or almost entirely black fibrils of varying length (up to 7 mm) and less than 0.3 mm thick. No apothecium has less than about 40 fibrillae. The medulla is constantly loose, KHO —, Pd —. Apothecial discs pale buff (alutaceous), not pruinose. The branches and stems (except near the base) are scattered with minute black verruculae, visible only with a lens. Hypothecium colorless, hyaline. Thecium gradually sordid yellow-brownish in upper third, without any trace of aeruginose pigmentation; numerous small granules are embedded in the upper part. Spores broadly ellipsoid, $8.9 \times 5.0-6.5\mu$. Thecium with Iodine blue, then dark aeruginose. Pycnoconidia were found: fusiform-bacillar (slightly tapered towards the ends), $9 \times 1\mu$, borne on crowded, digitate, exobasidial fulcra.

In the Herbarium of the Museo Argentino de Ciencias Naturales there is also present some material referable to this form.

It was collected in 1921 by the Argentine Faculty of Sciences Expedition from Tierra del Fuego, «cerro de 500 m 3 leguas al S. de Estancia 'La Marina'», and is very conformable with the type material. It was intermixed with *N. aurantiaco-ater* and *N. Rohmederi*. Some of the plants are in the «trachycarpoides»-phase (medulla KHO + red, Pd + yellow).

Habitually this form has a great resemblance to the f. *ushuaiensis* of *N. Rohmederi*, together with which it occurs in Santesson's collections; but the material can be easily separated out by the following characters: brown apothecial discs (becoming black only in morbose degenerating apothecia), greater abundance of fibrillae on the receptacle, and entirely colorless hypothecium (the latter character perhaps not constant in f. *ushuaiensis*). No obvious transitions to the typical *N. trachycarpus* were detected in the fairly copious material examined.

10. *N. perpusillus* M. Lamb.

No further material of this has come to light. It seems to be a good distinct species, characterised by its dwarf habit and very small apothecia.

11. *N. Rohmederi* M. Lamb, n. sp. (Tab. nostra I, figs. 1, 2).

Thallus sat magnus, vulgo 5-10 (-11) centim. altus, subrobustus, erectus, basi angusta substrato affixus, sat copiose ramosus; rami basales 1.2-2.5 mm crassi, teretes, vulgo leviter dilati, sulphurei (in partibus infimis fuscescentes), omnino laeves et nudi, subniti di, interdum paullo foveolati. Ramuli terminales tereti, zonis sulphureis nigrisque aut aeruginoso-nigris annulato- aut irregulariter variegati, laeves aut passim leviter foveolati (haud verruculosi), nitidi, haud fibrillosi, apicibus subcapillaribus fere omnino nigris. Soredia desunt. Medulla valde laxa, spongiosa, alba; axis tenuis. Apothecia sat numerosa, ramulis lateraliter insidentia, 3.5-8.0 mm diam., subrotundata aut saepe nonnihil difformia (reniformia), subplana aut convexa et leviter contorta, margine thallino tenuissimo, demum fere excluso; receptaculum sulphureum, laeve vel demum foveolatum (nunquam verruculosum), sat nitidum, eciliatum aut in margine ciliis paucis (1-7, raro ad 16) nigrescentibus muni-

tum. Discus ater, sat nitidus, epruinosis. Hypothecium incoloratum aut in parte superiori fuscescens. Thecium 40-50 μ altum, superne obscure aeruginosum. Sporae 8nae, simplices, incoloratae, late ellipsoideae aut subglobosae, $8.5-9.5 \times 6.5-7.5 \mu$. Pycnidia haud rara, ramulos terminales passim leviter inflantia; fulcra exobasidialia; pycnoconidia recta, anguste fusiformia, $8.9 \times 1 \mu$. Reactiones: mepalla KHO —, Pd —; thecium I + coerulescens, deinceps aeruginascens.

ARGENTINA. *Tierra del Fuego*: «cerro de 500 m 3 leguas al S. de Estancia 'La Marina'», coll. Argentine Faculty of Sciences Exped., 1921 (n° 564 *pr. p.*) (Herb. Mus. Argent. Cienc. Nat.); *Chubut*: Lago Futalaufquen, altit. 1800-2000 m, coll. G. Rohmeder, 1945 (Herb. Crypt. Instit. Lillo n° 2275) (holotype); on the Chilean frontier in lat. $44^{\circ}28'S.$, long. $71^{\circ}34'$, Hogberg, 1902 (Herb. Inst. Darwinion); *Río Negro*: Cerro Tronador, coll. Menéndez, 1943 (Herb. Crypt. Instit. Lillo n° 8597 *pr. p.*); Nahuel Huapí, Capitán, coll. Ljungner, 1933 (n° 1367) (Uppsala Museum); Nahuel Huapí, Cerro Catedral, coll. Pérez-Moreau, 1945 (n° 6767 *pr. p.*) (Herb. Mus. Argent. Cienc. Nat.); Nahuel Huapí, Cerro López, coll. T. Bernasconi, 1944 (Herb. Inst. Darwinion); Cerro Goye, altit. 1670 m s. m., «en la punta del cerro, lugar completamente árido», coll. J. C. Montiel, 1944 (Herb. Inst. Darwinion).

Type material in Herb. Crypt. Instit. Lillo and in herb. M. Lamb.

The cortex of the main stems frequently ruptures transversely (perhaps a postmortem effect), owing to the thin central axis, which takes up only $1/5$ to $1/4$ of their diameter. These cracks are usually not black-edged. The lax spongy-arachnoid nature of the medulla is constant. The apothecia often appear to be terminal by reason of the sharp bending back of the branch below the receptacle, and the point of attachment is often excentric, sometimes even right at the edge. The foveolation of the lower side of the receptacle, when present, is very characteristic (see photograph). The cilia on the receptacle are of variable length and thickness, up to 6 mm long, simple; some apothecia are quite devoid of them. Discs of immature apothecia are occasionally castaneous, but when fully develo-

ped are always jet-black. Hypothecium colorless or in some specimens light to dark brown in the uppermost part, 40-90 μ deep. Paraphyses embedded in mucilage, separable only with difficulty, not or only slightly thickened at tips. Spores biserial or irregularly massed in the ascus; usually with a distinct wall about 0.7 μ thick. Perifulcrum of pycnidia variously contorted-gyrose, faintly sordid-yellowish or almost colorless; fulcra simple or branched, digitate-tapered, 10-16 \times 1.5-2.0 μ .

The type material was found in considerable abundance, covering large areas of rock with a west exposure, associated with a few plants of *N. sulphureus*. From the copious material gathered it appears to be very homogeneous. It is characterised by the lax medulla, smooth branches, smooth to foveolate (never verruculose) underside of the receptacle, and the small and variable number of unequal cilia on the margins of the apothecia. The other specimens are also very conformable, differing only in a somewhat more extensive black coloration of the terminal branches. The specimen from Rio Negro, Cerro Goye, coll. Montiel, «lugar completamente árido», is a stunted condition, only 2-3 cm. high, but otherwise very typical. The collection from Estancia «La Marina» was associated with *N. aurantiaco-ater* and *N. trachycarpus* f. *elator*, and that from Nahuel Huapí, Cerro Catedral (somewhat morbose) with *N. aurantiaco-ater*.

F. ushualensis M. Lamb, n. f. (Tab. nostra II, fig. 4).

Ramulis pro maxima parte minutissime nigro-verruculosis, aeruginoso-nigrescentibus; receptaculo apotheciorum persistenter sat laevi, haud foveolato; ceterum ut in specie typica.

ARGENTINA. *Tierra del Fuego*: Sierra Alvear, southern slope, above Las Cotorras (about 20 km. ENE of Ushuaia), on rocks in the alpine region, altit. 900-1000 m, coll. Santesson, 1940 (n° 640^a pr. p., holotype); also near the same locality, but lower down, altit. 800-900 m, and on the other side of the Las Cotorras valley, Sierra Sorondo, northern slope, altit. 800 m; Monte Marcial above Ushuaia, altit. 700 m; Ushuaia, coll. Sra. Cortés, 1912 (Herb. Inst. Darwinion, n° 16321 pr. p.).

Type material in Herb. Mus. Bot. Stockholm and in herb. M. Lamb.

In addition to the differences mentioned in the diagnosis, the thecium is somewhat higher ($60-70\mu$), and the spores slightly narrower ($8.9 \times 5.0-6.5\mu$), but these are probably mere variations.

In the type material the plants are 5.0—8.5 centim. high, with main stems 1-2 mm thick near the base. The upper branches are in many places minutely verruculose with black verruculae similar to those shown on Pl. 5, fig. 6 of the author's previous paper (Lamb, 1939) for *N. acromelanus* f. *scabridulus*. They can only be seen under a lens, and are not to be compared with the coarse verrucosities found in such species as *N. aurantiaco-ater*. In addition many of the upper branches, and in a few places the basal stems also, are shaded with a dark aeruginose or aeruginose-blackish tinge. The underside of the receptacle, however, is always pure yellow (except at the extreme edges, where it may be slightly aeruginose) and quite free of verruculae. Thecium faintly sordid aeruginose throughout, more strongly in upper $1/4$, and covered in places by an epithecium of dull yellowish granules. The upper half of the hypothecium, in the specimens seen, shows progressive pigmentation; in the youngest apothecia there is only a scarcely perceptible brownish tinge, but in fully developed apothecia it is light to dark brown. Medulla, at least in the lower branches, always lax, the axis taking up only $1/5$ to $1/4$ of their diameter. The apothecia may have up to about 20 fibrillae on the margin of the receptacle, but usually fewer, the average perhaps about 10. No pycnidia found.

Plentiful material of this form was present in mixed gatherings which included also *N. aurantiaco-ater*, *N. antarcticus* and *N. sulphureus*; it was all very homogeneous.

EMENDED KEY TO ALL KNOWN SPECIES

1. Thallus sorediate.

2. Medulla (at least in lower stems and branches) lax, spongy-arachnoid; central axis thin, only $1/5$ to $1/4$ of the diameter of the branch. *N. sulphureus* (mainly of the southern hemisphere).

- 2a. Medulla compact; central axis thicker, about $1/3$ to $1/2$ the diameter of the branch.

3. Branches smooth or slightly foveolate, never distinctly verrucose or verruculose or plicate-rugose.

4. Branches slightly foveolate, more or less mottled with paler yellow patches, which in the upper branches become gradually converted into soredia; no black-edged transverse cracks present. *N. insularis*

4a. Branches smooth, not foveolate, without paler yellow patches; stems and branches of wax-like appearance, glistening or matt, commonly transversely ruptured with black-edged cracks.

5. Ultimate branches only slightly blackened; soredia \pm plane or slightly eroded, usually pale.

N. acromelanus

5a. Ultimate branches rather strongly blackened; soredia prominent, pulvinate-convex, usually black or dark gray. *N. acromelanus* var. *decipiens*

3a. Branches distinctly verrucose or verruculose or (in old plants) becoming plicate-rugose.

6. Central axis occupying about $1/3$ of the diameter of the branch; soredia pulvinate-convex, compact, blackish (or whitish by erosion).

N. sulphureus (mainly of the arctic regions).

6a. Central axis occupying $1/3$ to $1/2$ of the diameter of the branch; soredia either eroded, \pm plane, or pulvinate, light colored (yellowish), farinose or powdery-granulose.

N. antarcticus

1a. Thallus not sorediate.

7. Medulla (at least in lower stems and branches) lax, spongy-arachnoid; central axis thin, only $1/5$ to $1/4$ of the diameter of the branch.

8. Stems and branches more or less copiously fibrillose: receptacles of apothecia bordered by numerous fibrillae (20 or more on each apothecium); discs always buff-brown. *N. trachycarpus*

8a. Stems and branches not markedly fibrillose; receptacles of apothecia bare or with a few cilia (1-7, rarely up to 20, on each apothecium); discs of mature apothecia always jet-black.

N. Rohmederi

7a. Medulla compact; central axis thick, $1/3$ to $1/2$ the diameter of the branch.

9. Discs of apothecia persistently buff-brown.

10. Apothecial receptacles copiously fibrillose.

N. trachycarpus

10a. Apothecial receptacles with few or no fibrillae.

N. ciliatus

(abnormal states with brown apothecial discs)

9a. Discs of mature apothecia black or greenish black.

11. Stems and branches mottled with slightly raised, irregular, paler yellow patches. *N. Taylori*

11a. Stems and branches devoid of paler yellow patches.

12. Plant small (less than 2.5 centim. high), with minute apothecia not over 1 mm diam. *N. perpusillus*

12a. Plant usually larger, with larger apothecia.

13. Branches, at any rate the upper ones, and underside of apothecial receptacles distinctly verrucose (or reticulate-costate in aged specimens); stems and branches devoid of annular black-edged transverse cracks.

14. Medulla KHO + blood-red, Pd + yellow to orange. *N. melaxanthus*

14a. Medulla KHO + brownish or —, Pd + miniate red or — *N. aurantiaco-ater*

13a. Stems, branches and apothecial receptacles always smooth, never verrucose; transverse annular black-edged cracks often present on the stems and branches. *N. ciliatus*

LIST OF SYNONYMS

Alectoria Taylori Nyl. = *N. Taylori* (Hook. fil.) Nyl.

Cornicularia flavicans Pers. = *N. melaxanthus* (Ach.) Nyl. (*fide* Motyka, 1936, p. 33)

Lichen aurantiaco-ater Jacq. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *saltem pro parte*

Lichen pallidus Retz. = *N. sulphureus* (Koen.) Hellb.

Lichen sulphureus Koen. = *N. sulphureus* (Koen.) Hellb.

Neuropogon acromelanus var. *inactivus* M. Lamb = *N. acromelanus* (Stirt.) M. Lamb, « *inactivus* »-phase

Neuropogon antennarius Nees & Fw. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb. (*fide* Motyka, 1936, p. 28)

Neuropogon aurantiaco-ater f. *egentissimus* M. Lamb = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, « *egentissimus* »-phase

Neuropogon aurantiaco-ater f. *nigropallidus* M. Lamb = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb

Neuropogon aurantiaco-ater f. *normalis* M. Lamb = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, «*normalis*»-phase

Neuropogon aurantiacus M. Lamb = *N. melaxanthus* (Ach.) Nyl.

Neuropogon melaxanthus var. *ciliatus* Nyl. = *N. ciliatus* (Nyl.) Kphbr.

Neuropogon melaxanthus var. *sorediifer* Cromb. = *N. antarcticus* (DR.) M. Lamb, «*sorediifer*»-phase

Neuropogon melaxanthus f. *sulphurea* Hue = *N. sulphureus* (Koen.) Hellb. (*specimina ipsa Hueana verisimiliter ad aliam speciem spectant*)

Neuropogon strigosus M. Lamb = *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb

Neuropogon strigosus f. *subciliatus* M. Lamb = *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb

Neuropogon substrigosus M. Lamb = *N. trachycarpus* f. *substrigosus* (M. Lamb) M. Lamb

Neuropogon trachycarpus f. *trachycarpoides* M. Lamb = *N. trachycarpus* Stirt., «*trachycarpoides*»-phase

Parmelia melaxantha Spreng. = *N. melaxanthus* (Ach.) Nyl., *saltem pro parte*

Usnea acromelana Stirt. = *N. acromelanus* (Stirt.) M. Lamb

Usnea antarctica DR. = *N. antarcticus* (DR.) M. Lamb

Usnea antennaria Massal. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb

Usnea aurantiaca Mot. = *N. melaxanthus* (Ach.) Nyl.

Usnea aurantiacoatra Bory = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb (*specimina ipsa Boryana forsan ad aliam speciem pertinent*)

Usnea ciliata DR. = *N. ciliatus* (Nyl.) Kphbr.

Usnea fasciata Torrey = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb

Usnea frigida Dodge & Baker = *N. sulphureus* (Koen.) Hellb. (*?, e descript.*)

Usnea granulifera Mot. = *N. antarcticus* (DR.) M. Lamb *pro max. parte*, *N. decipiens* (M. Lamb) M. Lamb et *N. insularis* M. Lamb *pro min. parte*

- Usnea Hyppae* Räs. = *N. trachycarpus* Stirt., «*Hyppae*»-phase
- Usnea melaxantha* Ach. = *N. melaxanthus* (Ach.) Nyl.
- Usnea melaxantha* var. *Acharii* Hook. fil. & Bab. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *saltem pro parte*
- Usnea melaxantha* var. *angulosa* Müll. Arg. = *N. trachycarpus* Stirt. (*fide* Motyka, 1936, p. 37)
- Usnea melaxantha* var. *ciliata* Müll. Arg. = *N. ciliatus* (Nyl.) Kphbr.
- Usnea melaxantha* var. *fasciata* Hook. fil. & Bab. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *saltem pro parte*
- Usnea melaxantha* var. *granulifera* Hue = *N. antarcticus* (DR.) M. Lamb
- Usnea melaxantha* var. *Jacquinii* Hook. fil. & Bab. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *saltem pro parte*
- Usnea melaxantha* var. *nigropallida* Ceng. Samb. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb
- Usnea melaxantha* var. *sorediifera* Müll. Arg. = *N. antarcticus* (DR.) M. Lamb
- Usnea melaxantha* var. *sphacelata* Hook. fil. & Bab. = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *saltem pro parte*
- Usnea melaxantha* var. *spadicea* Mot. = *N. melaxanthus* f. *spadiceus* (Zahlbr.) M. Lamb
- Usnea melaxantha* f. *strigulosa* Howe jr. = *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb
- Usnea melaxantha* var. *subciliata* Zahlbr. = *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb
- Usnea melaxantha* var. *subciliata* f. *strigulosa* Zahlbr. = *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb
- Usnea Naumannii* Müll. Arg. = *N. trachycarpus* Stirt., «*trachycarpoides*»-phase (*fide* Motyka, 1936, p. 38)
- Usnea sphacelata* R. Brown = *N. sulphureus* (Koen.) Hellb.
- Usnea strigulosa* Mot. = *N. aurantiaco-ater* f. *strigosus* (Zahlbr.) M. Lamb, *saltem pro parte*

- Usnea sulphurea* Th. Fr. = *N. sulphureus* (Koen.) Hellb.
Usnea sulphurea f. *activa* Zahlbr. = *N. melaxanthus* (Ach.) Nyl.
Usnea sulphurea var. *granulifera* Vain. = *N. antarcticus* (DR.)
 M. Lamb
Usnea sulphurea var. *normalis* Vain. = *N. aurantiaco-ater*
 (Jacq. emend. Mot.) M. Lamb, « *normalis* »-phase, *pro*
max. parte, « *egentissimus* »-phase and *N. antarcticus*
 (DR.) M. Lamb, *pro min. parte*
Usnea sulphurea var. *normalis* f. *activa* Zahlbr. = *N. melaxan-*
thus (Ach.) Nyl.
Usnea sulphurea var. *spadicea* Zahlbr. = *N. melaxanthus* f. *spa-*
diceus (Zahlbr.) M. Lamb
Usnea sulphurea var. *subciliata* Zahlbr. = *N. aurantiaco-ater* f.
strigulosus (Zahlbr.) M. Lamb
Usnea sulphurea var. *subciliata* f. *strigulosa* Zahlbr. = *N. auran-*
tiaco-ater f. *strigulosus* (Zahlbr.) M. Lamb
Usnea Taylora Hook. fil. = *N. Taylora* (Hook. fil.) Nyl.
Usnea Taylora var. *Kranckii* Räs. = *N. aurantiaco-ater* (Jacq.
 emend. Mot.) M. Lamb, *aut fortasse* *N. trachycarpus*
 Stirt.
Usnea Taylora var. *subciliata* Räs. = *N. trachycarpus* Stirt.
Usnea Taylora var. *subspadicea* Räs. = *N. aurantiaco-ater* (Jacq.
 emend. Mot.) M. Lamb
Usnea trachycarpa Müll. Arg. = *N. trachycarpus* Stirt.
Usnea trachycarpa var. *ciliata* Räs. = *N. ciliatus* (Nyl.) Kphbr.
Usnea trachycarpa var. *sublaevis* Müll. Arg. = *N. trachycarpus*
 Stirt. (*vide* Motyka, 1936, p. 37)
Usnea trachycarpa var. *trachycarpoides* Vain. = *N. trachycar-*
pus Stirt., « *trachycarpoides* » phase

EMENDATION OF SOME LITERARY RECORDS

« *Neuropogon melaxanthum* » in Darbshire, *Wiss. Ergebn. Schwed. Südpolar-Exped.*, 1901-1903, IV. Lief. 11. p. 33 (1912) = *N. antarcticus* (DR.) M. Lamb, *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *N. sulphureus* (Koen.) Hellb.; in *Brit. Antarct. Terra Nova Exped.*,

Bot., part. 3, p. 32 (1923) = *N. ciliatus* var. *subpolaris* M. Lamb, *pro parte*

« *Neuropogon sulphureus* » in Hellbom, in *Bih. Kgl. Svensk. Vet.-Akad. Handl.* XXI. Afd. 3, n° 13, p. 21 (1896) = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *pro parte*

« *Neuropogon Taylora* » in Blackman, *Rept. Coll. Nat. Hist. Southern Cross*, p. 320 (1902) = *N. antarcticus* (DR.) M. Lamb and *N. sulphureus* (Koen.) Hellb.

« *Usnea antarctica* » in Mot., 1936, p. 24 = *N. antarcticus* (DR.) M. Lamb *pro max. parte*, *N. ciliatus* var. *subpolaris* M. Lamb *pro min. parte*

« *Usnea aurantiacoatra* » in Mot., 1936, p. 28 = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb *pro max. parte*, *N. ciliatus* (Nyl.) Kphbr. and *N. trachycarpus* Stirt., *pro min. parte*

« *Usnea fasciata* » in Mot., 1936, p. 31 = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb (forma typica + f. *strigulosus* (Zahlbr.) M. Lamb) *pro max. parte*, *N. ciliatus* (Nyl.) Kphbr. *pro min. parte*

« *Usnea melaxantha* » in Mot., 1936, p. 33 = *N. melaxanthus* (Ach.) Nyl., *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb, *etc.*

« *Usnea sphacelata* » in Räs., 1932, p. 10 = *N. aurantiaco-ater* (Jacq. emend. Mot.) M. Lamb

« *Usnea sulphurea* » in Szatala, 1939, p. 55 = *Usnea xanthopoga* Nyl. (*vide* Köfarágo-Gyelnik *in litt.*)

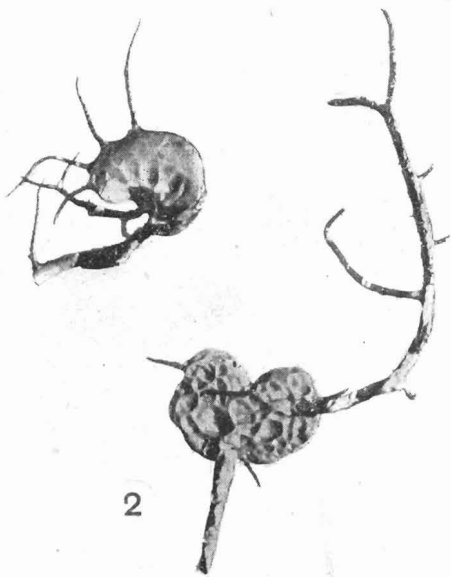
« *Usnea sulphurea* » in Herre, 1944, p. 60 = *N. trachycarpus* Stirt.

« *Usnea sulphurea* var. *sorediifera* » in Vain. *Rés. Voy. S. Y. Belgica, Lichens*, p. 11 (1903) = *N. acromelanus* var. *decipiens* M. Lamb

« *Usnea sulphurea* var. *sphacelata* » in Vain. *op. cit.* p. 12 = *N. ciliatus* (Nyl.) Kphbr.

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1, *Neuropogon Rohmederi* M. Lamb. The holotype specimen, $\times 1$; 2, *N. Rohmederi* M. Lamb. Two apothecia from the type material, seen from the underside, showing the smooth to foveolate receptacle and scanty marginal cilia, $\times 3$.



3, *Neuropogon trachycarpus* f. *elatior* M. Lamb. Part of the type material, $\times 1$;

4, *N. Rohmederi* f. *ushuaiensis* M. Lamb. Part of the type material, $\times 1$.